

REMARKS

Summary of the Office Action

Claim 13 stands rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,436,056 to *Wang et al.* (“*Wang*”).

Claims 12-14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wang* in view of U.S. Patent 6,589,227 to *Klint*.

Summary of the Response to the Office Action

Applicants thank the Examiner for the withdrawal of the previous rejections over *Klint*, U.S. Patent Application Publication No. 2003/0069522 to *Jacobsen et al.*, and U.S. Patent No. 5,932,035 to *Koger et al.* Applicants hereby withdraw claims 1-11, and amend claims 12-14. Accordingly, claims 12-14 are pending.

All Claims are Allowable Under 35 U.S.C. § 102(b)

Claim 13 stands rejected under 35 U.S.C. § 102(b) as being anticipated by *Wang*. Applicants respectfully traverse the rejection under 35 U.S.C. § 102(b) of claim 13.

Claim 13 recites a method of making a wire-stranded hollow coil body, including the steps of “clamping one end of a primary forming flexible linear metallic tube by means of a rotationally active chuck, and clamping mid-portions of said primary forming flexible linear metallic tube by means of mid-clamps, and stranding said primary forming flexible linear metallic tube in different strand turns depending on spans between said rotationally active chuck and each of said mid-clamps, and thereafter withdrawing an elongated core from said primary forming flexible linear metallic tube to provide an axial hollow portion in which said elongated

core being placed.” At least these features are absent from, and are neither disclosed nor taught by *Wang*.

The invention provides, for example, a primary forming flexible linear tube R may be primarily formed as an ordinary rope structure. Then the primary forming flexible linear tube R is further stranded in a stranding machine 10 with one end clamped at a rotationally active chuck 11 and the other end clamped at a slide-type fixture chuck 12. A static weight W provides a strand-turn resistant load when the primary forming flexible linear tube R is stranded. A conductor line 15 may be connected between the rotationally active chuck 11 and the slide-type fixture chuck 12 so as to apply an electric current and heat treat the primary forming flexible linear tube R. Accordingly, the flexible linear tube approaches idealistic linear response characteristics such as a high straightness-linearity and rotation-following ability, as described at page 10, ll. 1-21 and Table 1 of Applicants’ specification. Support for claim 13 is provided at, for example, page 15, line 16 – page 16, line 8, and Fig. 4 of Applicants’ specification as originally filed.

In contrast, *Wang* discloses an implement formed from an elongated polymer member that exhibits high torque fidelity after processing with tension, heat, and twisting. The processing orients the polymer in generally helical paths so that the torque imposed at the proximal end can be transmitted to the distal end without substantial whipping, even if the implement follows a long and tortuous pathway. See the Abstract of *Wang*.

The Office Action incorrectly asserts that the col. 6, lines 20-25 of *Wang* teaches or suggests the recited features of independent claim 13. In fact, the citation in *Wang* merely teaches that a catheter and guide wire may be torqued, pushed, and pulled into and from its

desired position. Applicants respectfully submit that the citation does not teach or suggest the recited features of claim 13.

The present invention shows a flexible linear metallic body formed with a multitude of coil line elements stranded by a wire rope stranding machine along a predetermined circular line to form a flexible linear metallic tube. However, *Wang* remains silent about a turning direction in which the polymer member is defined or regulated to be twisted. It is assumed that any twisting direction of the polymer member is sufficient in *Wang*.

The present invention defines the twisting direction of the flexible linear metallic tube. Namely, the flexible linear metallic tube is turned in the stranding direction and later unwound in the reverse direction as discussed in the present specification on page 16, lines 9-12. Thus, the flexible linear metallic tube is rotationally turned in the stranding direction with the use of the wire rope stranding machine.

Wang also teaches a heat gun, which is employed as a heating member to be applied during the heating stage. The heat gun is used to thermally soften the polymer member at a temperature of approximately 93-121°C in an aim to easily twist the polymer member. However, the present invention uses the electric resistor as described on page 16, line 16 of the specification to remove the residual stresses from the flexible linear metallic tube at the temperature of 400-500°C.

Further, *Wang* shows that the polymer member is in tension at the two stations lying apart, each of which moves at different speeds so as to extendedly extrude the polymer member by the difference of the speeds. This is clearly exemplified in *Wang* “[t]o improve the torque fidelity of the member 60, the stations 42 and 44 are moved in the same direction but the station 44 moves at a higher rate than the station 42 (arrows 62, 64), putting the polymer member in

tension and causing it to be translated past the heater (arrow 69). At the same time, the end of the member held at station 42, while being twisted due to the rotation at station 42.” See *Wang* at col. 6, lines 52-61.

In the present invention, the flexible linear metallic tube is rotationally turned in the stranding direction under the tension of the weight, thus preventing the flexible linear metallic tube from deforming to shrink in the lengthwise direction so as to stabilize the flexible linear metallic tube in its quality. However, in *Wang* the tension is caused by moving the stations 42 and 44, while the present invention intentionally applies the weight to the primary forming flexible linear metallic tube from the outset in order to induce the tension.

Thus, it is easily understood that the tension in *Wang* appears spontaneously upon moving the stations as opposed to the present invention in which the present invention set the primary forming flexible linear metallic tube previously in tension under the influence of the weight.

Furthermore, *Wang* improves the polymer member to exhibit high torque fidelity by leaving the polymer member as it is for a certain period of time after the polymer member is helically twisted. On the contrary, the present invention eliminates the necessity of leaving the flexible linear metallic tube for a certain period of time, and it is twisted without inviting the whipping, unfavorable roll or swell phenomenon. In this way, the present method enables the manufacturers to introduce a good rotation-following capability and good linearity for the flexible linear metallic tube, as distinctly exemplified by the specification on page 9, lines 5-6.

Moreover, *Wang* remains silent about the process of withdrawing an elongated core from the primary forming flexible linear metallic tube to form an axial hollow portion. Applicants respectfully submit that the citation does not teach or suggest claim 13.

As pointed out in MPEP § 2131, a claim is anticipated by a prior art reference only if each and every element as set forth in the claim is found. *Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051 (Fed. Cir. 1987). Therefore, Applicants respectfully assert that the rejection under 35 U.S.C. § 102(b) should be withdrawn because *Wang* does not teach or suggest each feature of independent claim 13.

All Claims are Allowable Under 35 U.S.C. § 103(a)

Claims 12-14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wang* in view of *Klint*. Applicants respectfully traverse the rejection under 35 U.S.C. § 103(a), of claims 12-14.

Applicants respectfully submit that independent claim 12 includes the features of a method of making a wire-stranded hollow coil body, including the steps of “clamping one end of a primary forming flexible linear metallic tube by means of a rotationally active chuck, and arranging the other end of said primary forming flexible linear metallic tube to be slidable in its lengthwise direction, and clamping said other end by a fixture chuck to impart a tensile force with said primary forming flexible linear metallic tube; and actuating said rotationally active chuck to strand said primary forming flexible linear metallic tube, and concurrently or thereafter heat treating said primary forming flexible linear metallic tube to remove a residual stress upon forming said coil line elements by electrically conducting between said rotationally active chuck.” At least these features are absent from, and are neither disclosed nor taught, alone or in combination, by either *Wang* or *Klint*.

Klint discloses a method of making a helical coil spring in which a multitude of coil line elements are stranded around a core metal (*i.e.* mandrel). As described at col. 6, lines 20-24, and illustrated in Fig. 7 of *Klint*, a row A of wires 5 are wound around a mandrel 7. After the

winding, the mandrel and the coils are subjected to a heat treatment to remove residual stresses from the wires. *Klint* merely shows a row of wires wound around a mandrel, and *Wang* merely shows an implement formed from an elongated polymer member that exhibits high torque fidelity after processing with tension, heat, and twisting.

While *Klint* discusses a heat treatment to remove residual stresses from wires, Applicants respectfully submit that neither *Wang* nor *Klint* teach or suggest at least the features of “heat treating said primary forming flexible linear metallic tube to remove a residual stress upon forming said coil line elements by electrically conducting between said rotationally active chuck,” as recited in claim 12. The assertion that *Klint* teaches or suggests this method is improper. *Klint* specifically mentions a method whereby an oven is used for approximately 22 hours to remove residual stresses of the wires placed inside it. See col. 6, lines 25-30 of *Klint*.

Further, *Klint* changes the stranding number of coil line elements to provide a plurality of interstices (designated by notation “B”) into the body portion in the longitudinal direction so as to facilitate bending of the body portion in tight turns along the vasculature. See col. 6, lines 34-39 and Fig. 9 of *Klint*. That is to say, the bending rigidity is altered by longitudinally providing interstices at every certain number of coil line unit of the flexible linear tube.

Contrary to the above structure, the present invention intends not to eliminate all the residual stresses, but to retain the residual stresses of different degrees (functionally gradient characteristics) depending on the sections longitudinally dividing the flexible linear metallic tube. Moreover, the subject invention does not involve in any interstice (void area) as explicitly exemplified in *Klint*. It becomes apparent that the present invention is also different from *Klint* in the point of object and functionally gradient characteristics.

With the present invention, it is possible to equalize the texture quality of the wire-stranded hollow tube, and provide the high straightness-linearity and rotation-following capability with the wire-stranded hollow tube as shown in Table 1 of the present specification. Comparing the methodical difference between the present invention and *Klint*, the method of the present invention concerns the following matters: the clamp and the rotation-active chuck; the sliding structure; the load applied under the stranding process; the stranding number of turns on the wire-stranded hollow tube; and the heat treatment devices. These elements are not taught by *Klint*. For example, the heat treatment process in *Klint*. Applicants respectfully assert that the present invention is different from *Klint* from the viewpoint of objects, structure, and advantages.

The Office bears the initial burden of establishing a *prima facie* case of obviousness. M.P.E.P. § 2142. If the Office fails to set forth a *prima facie* case of obviousness, Applicants are under “no obligation to submit evidence of nonobviousness,” such as unexpected results or commercial success. *Id.* In other words, if the Office fails to meet the initial burden of establishing a *prima facie* case of obviousness as to a given claim, then that claim is not obvious without any evidence of nonobviousness by the Applicants.

To establish a *prima facie* case of obviousness, three basic criteria must be met (see MPEP §§ 2142-2143). First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the prior art references must teach or suggest all the claim limitations.

As pointed out in M.P.E.P. § 2143.03, “[t]o establish *prima facie* obviousness of a claimed invention, all the claimed limitations must be taught or suggested by the prior art”. In *re Royka*, 409 F.2d 981, 180 USPQ 580 (CCPA 1974). As such, Applicants respectfully assert that

at least the third prong of *prima facie* obviousness has not been met. Therefore, Applicants respectfully request that the rejection under 35 U.S.C. § 103(a) should be withdrawn because *Wang* and *Klint* do not teach or suggest each and every feature of independent claim 12.

With regard to independent claim 13, Applicants respectfully submit that *Klint* does not make-up for the above-mentioned deficiencies of *Wang*. Thus, Applicants respectfully request that the rejection under 35 U.S.C. § 103(a) should be withdrawn because *Wang* and *Klint* do not teach or suggest each and every feature of independent claim 13.

Similarly, Applicants respectfully submit that independent claim 14 includes the features of a method of making a wire-stranded hollow coil body, including the steps of “accommodating lengthwisely divided sections of the primary forming flexible linear metallic tube into heating devices, each of which has a different heating condition depending on said lengthwisely divided sections, so as to heat treat said pluralistically divided sections individually to have residual stresses removed in different degrees.” At least these features are absent from, and are neither disclosed nor taught, alone or in combination, by either *Wang* or *Klint*.

The Office Action and the applied references of record are silent regarding lengthwisely divided sections of flexible linear tube that are individually heated to remove residual stresses in varying degrees. Thus, the present invention is not obvious.

As pointed out in M.P.E.P. § 2143.03, “[t]o establish *prima facie* obviousness of a claimed invention, all the claimed limitations must be taught or suggested by the prior art”. In re Royka, 409 F.2d 981, 180 USPQ 580 (CCPA 1974). Applicants respectfully assert that the cited references fail to teach or suggest all the limitations of claim 14. Therefore, Applicants respectfully request that the rejection under 35 U.S.C. § 103(a) should be withdrawn because *Wang* and *Klint* do not teach or suggest each and every feature of independent claim 14.

CONCLUSION

In view of the foregoing, Applicants respectfully request reconsideration and the timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution.

If there are any other fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-0310. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

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